

### **REMARKS/ARGUMENTS**

Claims 1-5, 15 and 18-27 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication Number US 2002/0100864 A1 ("Wake"). In making this rejection the examiner has stated that Wake discloses all of the features of the rejected claims. However, there are significant differences between the Wake prior art and the present invention.

As noted by the examiner, Wake discloses a method and system for optical imaging of a breast using time domain imaging techniques. Each of a plurality of detectors collects an optical signal and the system uses it to determine a temporal point spread function (TPSF). As is known in the art, the TPSF is fitted to the diffusion equation to determine optical characteristics of the breast, such as the absorption coefficient  $\mu_a$  and the reduced scattering coefficient  $\mu_s'$ . A time-gating signal is used by Wake to sample a portion of each TPSF curve that is then coupled to an integrator.

As Wake uses a plurality of detectors arranged in an orbit around the breast, there are a number of TPSFs collected. Each of the detectors has a corresponding processing circuit that does the time gating for that detected signal. A time-gate delay signal is used to select the number of time gates used for a given TPSF, and this signal must be changed as the length of the TPSF changes with changing detector position. However, contrary to the examiner's assertion, there is no temporal delay introduced into the propagation of the *optical* signals, and increasing the number of time gates detected for a particular TPSF therefore requires increasing the time-gate delay signal, and/or reducing the time gate interval.

The present invention operates in the same field as the Wake prior art, but is directed to a method and apparatus for more efficiently collecting time gate TPSF data. Indeed, a system such as that of Wake suffers from the precise limitations that are overcome by the present invention. The applicant, in seeking to improve the efficiency and reduce the acquisition time of time gated systems, have used an optical delay mechanism to allow simultaneous detection of different time gates. An example of how

this might be accomplished is shown in Figure 4 of the applicant's disclosure. Optical signals are collected from several adjacent collection ports of an object of interest, and each optical signal is coupled into a different optical fiber. Each of the optical fibers delivers the optical signal to a different one of several adjacent detection positions on a gated-ICCD detector, but each fiber has a different overall length. As a result, the propagation time for each of the optical signals is different. Since the optical signals are TPSFs, at any given point in time, a different section, or time gate, of the TPSF is reaching the detector at each of the different detection points. Thus, in one detector time window, different time gates are detected, as shown graphically in Figure 5.

In order to more clearly point out this feature of the invention, Claim 1 has been amended to recite collecting light from the object at a plurality of collection ports, and introducing a relative temporal delay to the optical signal temporal point spread functions. The claim has been further amended to recite detecting at least one time gate from each of the temporal point spread functions, wherein those gates are detected simultaneously. Similarly, independent Claim 24 has been amended to recite a light collection apparatus that collects light from the object at a plurality of collection ports to provide a plurality of optical signal based temporal point spread functions, and an optical delay feature that creates a relative optical delay between the optical signal temporal point spread functions. Claim 24 has also been amended to specify that the one or more time-gated detectors detect at least one time gate of each said temporal point spread function, and that those time gates are detected simultaneously. Nowhere in Wake is there any suggestion of a method or apparatus that includes these steps. Claim 2 has been canceled. Claims 3-5, 15 and 18-23 each depend ultimately from Claim 1, and Claims 25-27 each depend ultimately from Claim 24, and each of these claims is therefore equally unsuggested by the cited prior art. Reconsideration of Claims 1, 3-5, 15 and 18-27 under this ground for rejection is respectfully requested.

Claims 6-8 were rejected under 35 U.S.C. §103(a) as being obvious over Wake in view of U.S. Patent No. 5,692,511 ("Grable"). In making this rejection, the examiner has stated that Wake teaches all of the limitations of the rejected claims with the

exception of the basis for selecting time gates. The Grable reference has therefore been cited as disclosing the use of measurement criteria, including the properties of light and thickness of the desired medium to be measured. Without commenting on the applicability of Grable in this regard, it is noted that the combination of Wake and Grable fails to suggest the invention of Claim 1, as amended, for the reasons provided above with regard to the Wake reference alone. Since each of Claims 6-8 depends ultimately from Claim 1, each of these claims is therefore equally unsuggested by the cited prior art combination. Reconsideration of Claims 6-8 under this ground for rejection is respectfully requested.

Claims 13-14 and 16-17 were rejected under 35 U.S.C. §103(a) as being obvious over Wake in view of U.S. Patent Application Publication No. US 2002/0067901 ("Mukherjee"). In making this rejection, the examiner has stated that Wake teaches all of the limitations of the rejected claims except for the use of an ICCD camera. Mukherjee is therefore cited as showing the use of such a camera as a fast time-gated camera. Without commenting on the applicability of the Mukherjee reference in this regard, it is noted that the combination of Wake and Mukherjee fail to suggest the invention of Claim 1, as amended, for the reasons provided above with regard to the Wake reference alone. Since each of Claims 13-14 and 16-17 depends ultimately from Claim 1, each of these claims is therefore equally unsuggested by the cited prior art. Reconsideration of Claims 13-14 and 16-17 under this ground for rejection is respectfully requested.

The indication of the allowability of Claims 9-12 is acknowledged. Claim 9 has been amended to agree with the amendments to Claim 1, from which it depends, and Claim 10 has been canceled in light of the amendments made to Claim 9. Moreover, as the independent claims of the application are believed to now be in condition for allowance, Claims 9 and 11-12 have not been rewritten in independent form at this time.

In light of the foregoing amendments and remarks, it is respectfully requested that all the claims be allowed such that the application may be passed to issue. If it is

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believed that a telephone interview will help expedite prosecution of the application, the examiner is invited to call the undersigned.

Respectfully submitted,

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